

Space Flight Systems Directorate
Activities Report
August 23-29, 2009

ADVANCED FLIGHT PROJECTS OFFICE

Radioisotope Power System (RPS) Program Office

Regenerators Completed for First Pair of Advanced Stirling Convertors-E2 (ASC-E2):

The GRC has been fabricating regenerators using the latest master-buy of regenerator fibers. The diameter of these fibers is very similar to the material that was used several years ago, and this master-buy material yielded excellent fabrication results. 15 regenerator stacks were successfully sintered. Five were targeted to have the ideal mass in the final machined configuration, with five others intended to be slightly light and the remaining five slightly heavy. All 15 sintered stacks have been machined into the final regenerator configuration. The mass and dimensions of the final machined regenerators were as expected. All 15 regenerators were then delivered to Sunpower for cleaning and for use in the first pair of ASC-E2 convertors.

Contact: RXA/Randy Bowman, (216) 433-3205

ISS Research Program

Materials International Space Station Experiment 6A & 6B (MISSE 6A & 6B) Retrieval

Article: Kim de Groh of the Space Environment and Experiments Branch (RES) has been requested to provide information on Glenn's MISSE 6A & 6B flight experiments to Lori Johnston Meggs of MSFC for a web article on the up-coming retrieval of MISSE 6A & 6B. MISSE 6A & 6B will be retrieved during the STS-128 mission. MISSE 6A & 6B have been on the exterior of the International Space Station's Columbus module since March 22, 2008. At the request of Julie Robinson, International Space Station Program Scientist, Kim provided information on Glenn's 11 MISSE 6A & 6B experiments, which include six active experiments and five passive experiments, with a total of 168 samples. In addition, Kim answered Lori's questions which included: What do you expect to find with MISSE-6 and what makes it different than the previous MISSE suitcases? This work is supported by the International Space Station Research Project. Contact: RES/Kim K. de Groh, (216) 433-2297

Materials International Space Station Experiment 6 (MISSE 6) to be Retrieved:

Materials International Space Station Experiment 6A and 6B (MISSE 6A and 6B) are scheduled to be retrieved during the STS-128 mission rescheduled for launch on August 28, 2009. MISSE 6A and 6B were deployed on the Columbus Module in March 2008, in the ram and wake orientation, and upon return will have over one yr of exposure in low Earth orbit. The hardware will be shipped to NASA Langley where de-integration is scheduled to occur in early October. Principal investigators from NASA Glenn will be participating in the de-integration activities, returning experiments to NASA Glenn for post flight analyses. This work is supported by ISS Research Project.

Contact: RES/Donald A. Jaworske, (216) 433-2312 and RES/Kim K. de Groh, (216) 433-2297

ESMD**Advanced Capabilities Project Office****In-Situ Resource Systems (ISRU) - GRC Demonstrates ISRU Regolith Handling**

Technologies on the IPP FAST Zero-G Flight Campaign: A team from the GRC conducted a series of lunar gravity tests on a hardware rig entitled, "Flowing and Sifting of Lunar Simulant in Lunar Gravity" that flew on the IPP FAST Zero-G flight campaign. The campaign took place the week of August 10, 2009. Three different types of test cells were used during the flight tests. They consisted of hoppers of different geometrical contours and sifters and sieves of different screen mesh sizes. The hardware performed well throughout the two flight days of reduced gravity parabolas and provided valuable data for performance determination. The data obtained will help advance design rules for hoppers and sieving equipment in partial gravity for lunar surface systems. Contact: MAC/Kurt Sacksteder, (216) 433-2857

Fission Surface Power Systems (FSP) - Massachusetts Institute of Technology (MIT) Review

Article on Fission Surface Power (FSP): The FSP project was featured in a MIT Technology Review article entitled "A Lunar Nuclear Reactor." The story was prompted by a recent NASA GRC press release that described three successful component tests completed by the FSP team. Several pictures including a photo of a GRC Stirling power conversion system that was tested at Marshall and a photo of a large radiator panel in GRC's Vacuum Facility #6 with test engineer, Marc Gibson were included in the story. The article can be found at <http://www.technologyreview.com/energy/23247/> Contact: MAC/Don Palac, (216) 433-7094

Exploration Life Support (ELS) - Air Revitalization Loop Closure Technical Interchange Meeting (TIM) held at NASA Marshall Space Flight Center (MSFC) on August 18-20, 2009.

Robert D. Green (RET) gave a presentation titled, "Ceria-Based Cathodes for Carbon Dioxide Reduction in a Solid Oxide Electrolyzer" at the Air Revitalization Loop Closure TIM. The objective of the TIM was to facilitate the exchange of information on carbon dioxide reduction technologies in an open forum with NASA personnel, members of industry, and academia. Ceria-based cathodes, the subject of the presentation, have the potential to reduce the power requirements of a carbon dioxide solid oxide electrolyzer. The Air Revitalization Loop Closure task, under the ELS Project, is developing alternatives to the Carbon Dioxide Reduction Assembly to be launched to ISS in March 2010. Carbon dioxide reduction subsystems will maximize the recovery of essential elements, including oxygen and hydrogen, for future human space exploration missions. Contact: MAH/Nancy Hall (216) 433-5643, and RET/Robert D. Green, (216) 433-5402

SPACE OPERATIONS PROJECT OFFICE

Space Shuttle Support (Project Manager - Carol A. Quinn)

Purge, Vent and Drain (PV&D) Sub-System

OV-103 9th Flight Extension – The Orbiter Project Office asked all subsystems with Operations and Maintenance Requirements and Specification Document (OMRSD) Orbiter Maintenance Down Period (OMDP) requirements to evaluate if those requirements could be extended. The PV&D Problem Resolution Team (PRT) evaluated its PV&D OMDP requirements for OV-103 for the possibility of extending the requirements to 9 flights and 6 years. The assessment was

needed since the current SSP planning manifest shows the program's last flight (STS-133 or STS-134) in September 2010 on OV-103. This will be the 9th flight of OV-103 since its last OMDP, which exceeds the current OMDP limit of 8 flights and 5.5 years. In addition, OV-103's 5.5 year OMDP limit due date is October 1, 2010 so even a relatively small schedule slip will cause the program to exceed that requirement as well.

OMDP requirements needed to be evaluated and classified as follows:

Green - Acceptable to extend - no need to perform prior to the 9th flight/6 years

Yellow - Maybe yes/no - more time or data needed to definitively assess

Red - Not acceptable to extend - needs to be performed prior to the 9th flight/6 years

The PVD PRT OMDP assessment provided the following results: Out of a total of 14 PV&D OMDP requirements:

Four were classified as Green

Two were classified as Yellow

Eight were classified as Red

The next step in the assessment is for the PV&D PRT to finish its evaluation of the two yellow requirements. Ground Ops will evaluate all the subsystems RED requirements (a total of 20 requirements) for planning to perform during the remaining 2 ground processing flows (following OV-103's next flight STS-128 in August). Contact: DEF/Diana Centeno-Gomez, (216) 433-3259

Communication, Navigation & Networking re-Configurable Testbed (CoNNeCT)

(Project Manager - Ann P. Over): A Critical Design Review (CDR) Technical Interchange Meeting was successfully completed on August 19-20, 2009 for the Harris Software Defined Radio (SDR) for the CONNECT payload. Harris is the vendor for the Ka-band SDR for the CONNECT payload. The CDR presentation demonstrated a final detailed design using completed drawings and analyses. The review discussed overall conformance of the requirements specified in the Product Specification and Interface Control Document. The review described the implementation of all interfaces, mechanical and thermal, and necessary interactions with the CONNECT payload. This review covered programmatic, technical, manufacturing flow, inspection points, material, part list, test and verification, and Quality Assurance and risk management topics. The review was successful, and Harris is proceeding with the fabrication of the engineering and flight radios. In addition, Harris demonstrated operation of their breadboard radio, which will be delivered to NASA GRC on September 1, 2009.

Space Communications and Navigation (SCaN) (Project Manager - Kul B. Bhasin):

Based on the successful pilot of the summer intern project, a proposal was sent to Barbara Adde at the SCaN strategic business office for the continued support of summer interns at Glenn Research Center next summer. The proposal was very well received by SCaN strategic business office and has a potential to expand to other Centers. Based on the proposal, \$70K has been allotted to fund 8 summer interns in FY10.

Space Network Ground Segment Sustainment (SGSS) (Project Manager – Kul B. Bhasin):

Provided full cost resource estimates to the SGSS Project Office for FY10-12 totaling \$7.5M.